PROJECT PROGRESS REPORT I

For The Project Of

LOCALLY CONNECTED ADAPTIVE GABOR FILTER FOR REAL-TIME MOTION COMPENSATION

For the Period from October 20th of 1993
to January 19th of 1994

$N00014-94-1-0077$

This Report Is Submitted to ONR

January 16th, 1992

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The Progress Report

Starting October 20th, the project of *"locally connected adaptive Gabor filter for real-time motion compensation,"* with grant number N00014-94-1-0077, has been conducted under the supervision of the principal investigator, Professor Hua Li of Texas Tech University.

The progress has been made as planned in the project proposal, pp. 20-21. In particular, the following progress has been accomplished as itemized below:

1. The theoretical analysis of the proposed algorithm and the refinement of the algorithm to make it suitable for the implementation on SUN SPARC station. The theoretical analysis part includes

   (a) The derivation of the relationship between the spatial frequency sensitivity of biological visual system and the selection of σ values of the locally connected Gabor filter.

   (b) The derivation of the kernel sizes in terms of pixel values for Gabor filters, which is crucial for the future real-time image convolution.

2. Experiments for the verification of the selected kernel sizes and spatial frequency sensitivity determined by σ. The experiments include

   (a) Selection of Gabor filters by performing image convolutions of artificially generated periodic patterns. Three pairs of images were used with different spatial frequency characteristics, and experimental data set from the convolutions was collected.

   (b) The optical flow was computed from these selected Gabor kernels. The data is now under analysis.

3. Program modules have been developed for the SUN SPARC station for experiments and later will be used as a bench mark tool to evaluate the VLSI chip performance.

In addition to the above planned work stated in the proposal, we have

1. Applied for MOSIS fabrication account, the contract has been submitted to MOSIS for their action.

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2. Formed a research team. Two graduate research assistants (one Ph.D. student and one Master student), Mr. Donald Symes, and Mr. Laszlo Moldovan have been appointed and they already started working on the project.

3. Produced a research memo on the selection of kernel sizes of Gabor filter and on the relation of the spatial frequency selectivity between the kernel size and the human visual system. The memo can be requested directly from the principal investigator.

The next phase will be the continuation of the theoretical analysis as planned in the proposal, and optimization of the locally connected Gabor filters. In addition, verification and validation of the theoretical result will be performed and real images will be used.

The End.